REMARKS

The Office Action dated January 18, 2008 has been received and carefully studied.

By the accompanying amendment, claims 16-52 have been cancelled without prejudice to filing divisional applications with respect thereto.

The Examiner rejects claims 1-5, 7-10, 13 and 14 under 35 U.S.C. §103(a) as being unpatentable over White et al., U.S. Patent No. 6,539,968, in view of Inayama et al., U.S. Patent No. 6,584,999. The Examiner states that White et al. disclose a fluid flow control apparatus comprising all of the elements of claim 1 except for the solenoid type proportional control device comprising a pneumatic valve. The Examiner cites Inayama et al. for its teaching of the use of a pneumatic proportional control valve 76, 78 for controlling a proportional fluid control valve for the purpose of providing a self-contained flow control device. The Examiner concludes that it would have been obvious to have used the pneumatic proportional control valve of Inayama et al. in place of the solenoid type proportional control device 43 of White et al. to provide a self-contained flow control device.

By the accompanying amendment, claims 1 and 9 have been amended to recite that the frictional flow element comprises a helical coil. Claims 2 and 14/9, rendered redundant by the amendment, have been cancelled.

Neither White et al. nor Inayama et al. discloses or suggests a frictional flow element comprising a helical coil. Indeed, White et al. disclose a sintered metal cylindrical plug shaped

member having a predetermined porosity. The plug shaped member is fabricated of stainless steel or nickel particles suitably compressed and sintered to provide the desired porosity and flow restriction characteristics. It is supported in a tubular sleeve, which in turn is mounted in a tubular adapter supported in a counterbore between seal rings in the body of the mass controller. Inayama et al. is completely silent as to the use of any frictional flow element.

The Examiner states that a helical flow coil restrictor is well-known in the art and it use is a design choice that neither provides any new and/or unexpected result nor solves any stated problem. Applicants respectfully disagree. Initially, nowhere is there any suggestion in the cited art to modify the apparatus of White et al. by using a helical coil in place of the sintered metal cylindrical plug. In addition, the use of a helical coil frictional flow element is advantageous for many reasons, including simple removability from the flow control apparatus so that a different helical coil can be interchanged. This allows the parameters of the frictional flow element, such as its length and diameter, to be changed easily. As stated on page 30 of the instant PCT application, the diameter and length of the frictional flow element is a function of the pressure drop needed so that noise becomes negligible. The length and diameter can be manipulated depending upon the particular fluid in the system. In addition, the use of a helical coil allows the frictional flow element to be coiled upon itself, thereby saving considerable space in the apparatus (see Figure 2). A helical coil is also inexpensive and simple to fabricate, particular in comparison to

the sintered metal member of White et al. These advantageous features of the instant frictional flow element are not disclosed or suggested by White et al.

The Examiner also rejects claim 6 under 35 U.S.C. §103(a) as being unpatentable over White et al. and Inayama et al., and further in view of McLoughlin et al., U.S. Patent No. 6,348,098, and claim 15 as being unpatentable over White et al. and Inayama et al., and further in view Balazy, U.S. Patent No. 6,152,162. McLoughlin et al. is cited for its disclosure of a suckback valve in pneumatic communication with a pneumatic proportional control valve. Balazy et al. is cited for its disclosure of means for regulating the fluid pressure of the fluid entering the first fluid inlet.

Claims 6 and 15 are believed to be allowable by virtue of their dependence, for the reasons discussed above.

The Examiner has indicated that claims 11 and 12 contain allowable subject matter. By the accompanying amendment, claims 11 and 12 have been rewritten in independent form, including the limitations of the base claim and any intervening claims. Claim 14 has been amended to depend from claim 11, and new claim 53 has been added dependent on claim 12.

Reconsideration and allowance of all pending claims are respectfully requested in view of the foregoing.

Respectfully submitted,

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Amendments to the claims

This list of claims replaces all prior versions, and listings, of claims in the application.

Listing of claims

1. (Currently amended) Fluid flow control apparatus, comprising: a proportional fluid control valve having a fluid inlet and a fluid outlet; a pneumatic proportional control valve in communication with said proportional fluid control valve for modulating said proportional fluid control valve; a frictional flow element having a frictional flow element fluid inlet in fluid communication with said fluid outlet of said proportional fluid control valve and having a frictional flow element fluid outlet spaced from said frictional flow element fluid inlet, said frictional flow element comprising a helical coil and creating a pressure drop between said frictional flow element fluid inlet and frictional flow element fluid outlet; means for measuring said pressure drop; a controller in communication with said pressure drop measuring means and with said pneumatic proportional control valve for controlling the flow of fluid through said proportional fluid control valve in response to said measured pressure drop.

2. (Cancelled)

3. (Original) The fluid flow control apparatus of claim 1, further comprising means for sensing temperature of said fluid, and wherein said controller compares said sensed temperature to a

predetermined temperature and controls said pneumatic proportional control valve in response to said comparison.

4. (Original) The fluid control apparatus of claim 1, wherein said means for measuring said pressure drop comprises a first pressure sensor for sensing pressure of said fluid at said fluid outlet of said proportional fluid control valve and a second pressure sensor for sensing pressure of said fluid at said frictional flow element fluid outlet.

5. (Original) The fluid control apparatus of claim 4, wherein said first pressure sensor is contained in a housing integral with said proportional fluid control valve.

6. (Original) The fluid control apparatus of claim 1, further comprising a suckback valve in pneumatic communication with said pneumatic proportional control valve.

7. (Original) The fluid control apparatus of claim 1, wherein said pneumatic proportional control valve is a solenoid.

8. (Original) The fluid control apparatus of claim 1, wherein said frictional flow element fluid inlet is in fluid communication with said fluid outlet of said proportional fluid control valve such that all of the fluid flowing from said fluid outlet of said valve must enter said fluid inlet of said frictional flow element.

9. (Currently amended) A method of controlling the dispense of fluid from a dispenser to a point of use, comprising: providing a proportional fluid control valve having a first fluid inlet and a first fluid outlet; providing a frictional flow element in fluid communication with said first fluid outlet, said frictional flow element comprising a helical coil and creating a pressure drop; sensing said pressure drop across said frictional flow element; and modulating said proportional fluid control valve in response to said sensed pressure drop.

10. (Original) The method of claim 9, wherein a pneumatic proportional control valve is provided to modulate said proportional fluid control valve pneumatically.

11. (Currently amended) ~~The method according to claim 10,~~ A method of controlling the dispense of fluid from a dispenser to a point of use, comprising: providing a proportional fluid control valve having a first fluid inlet and a first fluid outlet; providing a frictional flow element in fluid communication with said first fluid outlet, said frictional flow element creating a pressure drop; sensing said pressure drop across said frictional flow element; and modulating said proportional fluid control valve in response to said sensed pressure drop, wherein a pneumatic proportional control valve is provided to modulate said proportional fluid control valve pneumatically, and further comprising holding the pneumatic proportional control valve open to allow a minimum level of purge gas to bleed from the pneumatic

proportional control valve.

12. (Currently amended) ~~The method of claim 10,~~ A method of controlling the dispense of fluid from a dispenser to a point of use, comprising: providing a proportional fluid control valve having a first fluid inlet and a first fluid outlet; providing a frictional flow element in fluid communication with said first fluid outlet, said frictional flow element creating a pressure drop; sensing said pressure drop across said frictional flow element; and modulating said proportional fluid control valve in response to said sensed pressure drop, wherein a pneumatic proportional control valve is provided to modulate said proportional fluid control valve pneumatically, and wherein there are a plurality of fluid control valves, and wherein said pneumatic proportional control valve is held open at a set level such that the pneumatic pressure supplied to each said fluid control valve offsets differences among said plurality of fluid control valves allowing each said fluid control valve to open in the same amount of time and/or with the same pressure.

13. (Original) The method of claim 10, further comprising providing a controller responsive to said measured pressure drop for controlling said pneumatic proportional control valve.

14. (Currently amended) The method of claim ~~9~~ 11, wherein said frictional flow element comprises a helical coil.

15. (Original) The method of claim 9, further comprising means for regulating the fluid pressure of said fluid entering said first fluid inlet.

16-52. (Cancelled)

53. (New) the method of claim 12, wherein said frictional flow element comprises a helical coil.